# Renewable Energy in Australia: the Renewable Energy Target (RET), Feed-in-Tariffs (FITs), Green Power, Solar Hot Water

## Status in 2011, trends out to 2030

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# 1. Introduction

This paper reviews Australian renewable energy policies and programs, excluding R&D programs and renewable initiatives under the Clean Energy Futures Act.[1] These will be reported on when implementation details are available, for example, their standing under the Renewable Energy Target (RET).

Also included are some international renewables trends.

[1] Under the Act a **Clean Energy Finance Corporation (CEFC)** with a A$10 billion budget is to be established for investment in renewable energy, low pollution (cogeneration, tri-generation) and energy efficient technologies. The independent agency is expected to support clean energy technologies through loans, loan guarantees and equity investments, with any returns being reinvested in clean energy. It will not invest in carbon capture and storage.

The CEFC will be complemented by an **Australian Renewable Energy Agency (AREA)** with A$3.2 billion to subsidise renewable energy technologies. No explanation on how these agencies would relate to the existing Renewable Energy Target (RET) has thus far been provided.

The impact (level, timing) on emissions of these "new" (some repackaging) measures is difficult to determine at this time. However, it is probable that the new renewables initiatives will not have any significant impact until post-2020.

# 2. Feed-in-tariffs (FITs)

## Federal

No FIT but PVs and other small renewable energy generating units (SGUs) of up to 100 kW can create Renewable Energy Certificates (RECs) under the federal Renewable Energy Target (RET), now split into two parts: large scale renewable energy target (LRET) and small scale renewable energy systems (SRES) for SGUs. PV RECs are now swamping the market due to falling PV costs, REC values and State FITs. As of December 2011 there is a huge surplus of RECs: about x3 the total 2011 RET requirement.

See impact analysis of this REC surplus below.

## State

### New South Wales (NSW)

A gross (all output eligible) FIT (for generation until 1 December 2016) at $600/MWh in 2008 to 27 October 2010. The FIT then reduced to $200/MWh, due to the increasing cost of the huge PV take-up. FIT terminated on 28 April 2011 (allowing 40,000 more applicants). Some retailers continue to offer a FIT of $600-$800/MWh. An estimated (IPART) 370 MW of PVs will be installed in New South Wales by 2012.

Retailer costs of the FIT are currently recovered from the New South Wales Government from the NSW Climate Change Fund but some recovery via retailers is planned.

### Victoria

Net (only export to grid eligible) FIT of $600/MWh minimum (5 kW maximum installations) capped at 100 MW and $10 per year impact on average electricity bills. The average electricity residential retail price for standard contracts was $220/MWh in 2011 (including GST).

In September, the cap was reached and the FIT was renamed a Transitional FIT set at $250/MWh available for five years for new installations. The TFIT will apply until results and their consideration from a review of it is completed by the Victorian Competition and Efficiency Commission in 2012.

Some retailers, for example AGL, offer premiums above the TFIT.

### Queensland

Net FIT of $440/MWh introduced in 2008 for 20 years for up to a 30 kW system.

### South Australia

Net FIT of $440/MWh in 2008, increased to $540/MWh (some retailers offered up to $600/MWh) August 2010 for 20 years, but terminated on 30 September 2011.

From 1 October 2011 new FIT customers will receive $160/MWh for exports to the grid until 1 October 2013.

The South Australian Essential Services Commission on 27 January 2012 released its Final Price Determination for the solar Feed-in Tariff (FIT) Premium to apply from 27 January 2012 to 30 June 2014.

The FIT Premium, which is credited on solar customers' electricity bills when they generate more electricity than they use, reflects the fair and reasonable value of fed-in electricity to electricity retailers.

The Commission's Final Determination is to set the FIT Premium as follows.

| **Feed-in Tariff Premium (nominal cents per kWh and GST exclusive)** | | |
|---|---|---|
| **2011-12** | **2012-13** | **2013-14** |
| 27 January 2012 to 30 June 2012 | 1 July 2012 to 30 June 2013 | 1 July 2013 to 30 June 2014 |
| $71/MWh | $98/MWh | $112/MWh |

All electricity retailers are required to provide at least this minimum FIT Premium to solar customers but may choose to credit a higher amount.

Solar customers are entitled to receive both the FIT Premium from electricity retailers and an additional credit from the electricity distributor, ETSA Utilities. Under the feed-in legislation, ETSA Utilities must pay eligible solar customers $440/MWh of fed-in electricity (for those that connected, or obtained ETSA Utilities' approval to connect the PV unit prior to 1 October 2011). From 1 October 2011, those solar customers that connected, or received approval to connect, the PV unit will receive a credit from ETSA Utilities of $160/MWh.

The current distributor funded FIT scheme provides generous subsidies to existing customers with solar PV, particularly those who are eligible for the $440/MWh amount. While the Commission supports the decision to phase out the distributor funded scheme for new customers, it notes that the scheme may cost all South Australian energy customers around $90 million per annum, which adds around $65 to the average annual household energy bill.

Under the amended legislation, those receiving $440/MWh also get the FIT Premium determined by the Commission, which results in a total FIT amount of $511/MWh from 27 January 2012. This will increase to about $530/MWh from 1 July 2012. The total FIT amount is over seven times the current value of wholesale electricity produced by the systems, and over four times the value of electricity being generated by wind farms (approximately $110/MWh).

About 270 MW of PVs are expected to be installed by April 2012. Recent surveys by ETSA Utilities in South Australia indicates actual PV output could be only 67 per cent of theoretical output due to installation issues (orientation, etc.).

### Western Australia

Net FIT of $400/MWh for 10 years for up to 10 kW installations. FIT reduced to $200/MWh in May 2011. Terminated on 2 August 2011; 150 MW cap reached. Renewable Energy Buyback Scheme (REBS) introduced. Net FIT: Synergy offers $70/MWh for exports to grid.

Budget increased from $23 to $127 million.

### Northern Territory

Net fit of $190/MWh.

### Tasmania

Net FIT at $200/MWh introduced in 2011.

### Australian Capital Territory (ACT)

Gross FIT in 2009 of $457/MWh reduced to $200/MWh from 1 July 2010 to 30 May 2011: for 20 years for up to 30 kW systems. Retailers are required to make a $60/MWh (estimate of NEM purchase cost avoidance) contribution to the FIT cost. ACTEW-AGL now pays customer tariff rate for exports to grid (Solar Buyback Scheme).

## FIT summary

As installations surged in 2010 and 2011 under State/Territorial FIT programs, together with RET and falling gross (excluding program incentives) PV prices, FIT incentives have been scaled back significantly.

Note that some retailers, for example AGL in Victoria, pay a premium above the mandated FIT.

# 3. Federal renewable electricity target (RET)

## RET 2011 – 2020

From 1 January 2011 there are **two** RET elements.

### SRES (Small Scale Renewable Energy Systems)

Covers SHW/HP units, small generation units (SGUs, mainly PVs); no cap but guaranteed price of $40/MWh/REC (STC) through the STC clearing house (but some are sold for a lower price on the open market). All annual SRES REC (STCs) created must be purchased/acquitted by retailers according to their electricity market share. A minimum annual STC level but **no** maximum.

**In 2011** through to 2020 the minimum is 4,000 GWhs. However, in 2011 it was expected (March 2011) about 34 x $10^6$ STCs will be created under SRES[2]. The Office of the Renewable Energy Regulator (ORER) retailer liability was set at 28 x $10^6$ RECs for 2011, so about 6 x $10^6$ STCs will be carried over into 2012. At an **average** price of $38/STC cost to retailers in 2011 would be approximately $1.064 billion. Spread over about 200,000 GWhs of liable sales, cost per MWh of sales would be about $5.32/MWh, $5.85/MWh including GST.

### LRET (Large Scale Renewable Energy Target)

LRET covers renewable electricity generators of >100 kW capacity. LRET liability in 2011 was 10,400 GWhs (10.4 x $10^6$ LGCs). At an **average** REC price of $40/Large Generator Certificate (LGC), cost of LGC purchases would be $(10,400,000 x 40) = $416 million, which spread over 200,000 GWhs, cost would be $2.08/MWh, $2.29/MWh including GST.

**Total** RET liability cost (SRES plus LRET) from 2011 liabilities would then be $8.14/MWh. See below for analysis of RET status and projection out to 2030.

LRET liability increases to 41,000 GWhs in 2020 and remains at that level until 2031.

[2] Since this report was first completed in November 2011, latest data (January 2012) from the Office of the Renewable Energy Regulator (ORER) indicates over 50 million STCs will have been created under SRES creating a carry over into 2012 of over 22 million, not the 6 million previously estimated.

# 4. PV economics

Net of RECs a 1.5 kW PV system in the **State of Victoria** now costs about $3,000 on average (wide variation in quotes). Average Victorian electricity use is about 6 MWh/a. A 1.5 kW system would produce up to 2 MWh/a but note that average actual production is lower (by up to 40 per cent) due to non-optimal installation and system matching. PV output is seasonal but peaks at about 13:30 in summer and is negligible in peak demand periods (18:00 to 21:00).

The PV export to the grid (for net FIT) would be about 40 per cent (0.8 MWh/a) and internal use about 60 per cent (1.2 kWh/a). The FIT is now approximately $250/MWh for newly connected PVs and peak electricity energy cost was about $220/MWh (including GST) in 2011 and could average about $260/MWh over 2012-18.

Annual returns from a 1.5 kW PV system in Victoria installed in 2012 would be about ($0.8 x 250 + 1.2 x 250) = $500 – giving a payback of about six years.

However, average **actual** installed performance would increase this to about eight years.

Also, **IF** electricity prices for a **residence with a PV system**, for example, to $300/MWh versus $250/MW for **non-PV households**, the paybacks due to payment of this PV installation premium charged by retailers are increased to over 12 years.

Currently a multiplier applies to the deemed over life output of PV units (and other SGUs). The multiplier is x3 from 1 July 2011; x2 from 1 July 2012; and x1 from 1 July 2013.

Over time the economics of PVs will depend on:

- any changes in Federal and State/Territorial policies, for example, in RET/SRES and FITs;
- the gross (net of subsidies) PV costs which continue to fall (scale economics, competition);
- future retailer electricity costs; and
- improvements in installation practices.

# 5. Thermal: Solar hot water (SHW) and heat pumps (HPs)

Receive STCs under RET and also State subsidies, for example, rebates and VEECs in Victoria.

| | |
|---|---|
| **RECs** (State of Victoria) | average 28 for solar-electric<br>average 38 for solar-gas |
| **REC prices** | $40 (through ORER STC). |
| **VEECs** | Higher for solar-gas (60 versus 45): VEEC price averaged approximately $20 in 2011. |

**Economics:** SHW displacing gas in Victoria (80 per cent of Victorian residential HW gas systems) system.

GSHW cost with rebates (STCs, VEECs, SV) approximately $2,400 (December 2011).

Saving with GSHW over straight gas WH approximately 70 per cent, on average about 18 GJ/year.

Average cost of gas over 2012-2018 = $18/GJ.

Therefore save $(18 x 18) = $324/year.

**Payback** = 7.4 years.

Approximately 2.5 million SHW RECs (STCs) were created in 2011.

At average 35 RECs/installation
= 71,000 SHW installations, which is approximately 9 per cent of the annual residential hot water (HW) market.

According to ABS 4602 data (March 2011), SHW residential penetration in Victoria was 3.8 per cent in early 2011, up from 2.6 per cent in 2008 and 1 per cent in 2005.

From REC data SHW and HP installations have been falling over 2009, 2010 and 2011 mainly due to household preference to install PVs rather than SHW/HPs as their "solar contribution", despite SHW/HP rebates.

| | | **Installations @ 35 RECs/installation** |
|---|---|---|
| 2009 | 7,800,000 RECs | 223,000 |
| 2010 | 3,600,000 RECs | 103,000 |
| 2011 | 2,500,000 STCs (estimate) | 71,000 |

According to this data SHW/HP share of annual hot water market has fallen from about 30 per cent in 2009 to 9 per cent in 2011.

(**NOTE** that some HP installations are in the commercial sector.)

# 6. RET status, December 2011

**2009 RECs banked, 1 January 2009, 5,300,000**

RECs created

| | |
|---|---|
| SHW | 5,000,000 |
| PV | 3,000,000 |
| Baseline | 700,000 |
| Large scale | 6,000,000 |
| Created | 14,700,000 |

TOTAL available: approximately 20,000,000 (14,700,000 + 5,300,000).

Acquittal requirement (RET, GP, VRET): approximately 11,000,000.

**2010 RECs banked 1 January 2010, 9,000,000** (20,000,000 – 11,000,000)

RECs created

| | | |
|---|---|---|
| SHW | 5,000,000 | |
| PV | 25,000,000 | |
| Baseline, large | 7,000,000 | 37,000,000 |
| Available | 46,000,000 (created plus banked) | |

**Acquittal required**: approximately 13,500,000 (RET plus Green Power).

## 2011 LRET, SRES commenced

All banked RECs as at 1 January 2011, approximately 32,500,000 (46,000,000 – 13,500,000), are available for LRET acquittal and the LGC price was $40-45.. (SRES RECs (STCs) created in 2011 must be acquitted by liable parties.)

**IF** all the 32,500,000 banked RECs were used in LRET and 2010 RET output continued, there would be no further need for **new** LGCs until 2015.

| | | **Annual** | **Surplus on 1 January of year** |
|---|---|---|---|
| **LRET** | 2011 | 10,400 | 32,500 |
| – new schedule | 2012 | 16,338 | 23,162 |
| (GWhs) | 2013 | 18,238 | 11,924 |
| | 2014 | 16,100 | 2,824 |
| | 2015 | 18,000 | -8,176 |
| | 2020 | 41,000 | – |

On this basis LRECs from new plants would not be required until 2014-15.

In 2015 about 8,176 GWhs will be required from new LRET generators.

1,000 MW of wind generates about 2,800 GWh at 32 per cent capacity factor.

Therefore in 2014-15 need to build about another 3,000 MW of wind to meet 2015 requirements if all new large scale generation came from wind.

Note that the low LGC price is making it very difficult for large scale solar plants under the Federal Solar Flagships project to arrange viable financing.

## 2011

Estimated (December 2011)

STC (SRES) and LGC (LRET) creation.

**STCs**

34,000,000 created (likely to be much higher when full data for 2011 is available: could be up to 55,000,000).

**LGCs**

7,500,000 created (final amounts not yet available).

# 7. RET impact on electricity prices

## Estimate of RET costs based on SRES and LRET forecasts and 200,000 GWh liable sales of 210,000 in 2015; 220,000 in 2020, 235,000 in 2030

### 2010 cost

13,500,000 required x $40/REC (average?) (assumes Green Power REC costs are recovered from participant customers) = $540 million.

Over 200,000 liable GWhs cost/MWh:
= $2.70/MWh, $2.97/MWh including GST

### 2011

| | |
|---|---|
| SRES | = $28 \times 10^6 \times 38$ (STC)<br>= $\$1.064 \times 10^9$ |
| LRET | = $10.4 \times 10^6 \times 40$<br>= $\$0.416 \times 10^9$ |
| Impact | = $\$1.480 \times 10^9 \div 0.200 \times 10^9$, spread over 200,000 GWhs liable sales<br>= $7.40/MWh, $8.14/MWh including GST |

### 2012

| | |
|---|---|
| SRES | = approximately $40 \times 10^6$ to be acquitted (PV surge in 2011) |
| Cost | = $40 \times 10^6 \times 40$<br>= $\$1.600 \times 10^9$ |
| LRET | = $16.338 \times 10^6$ LGCs to be acquitted |
| Cost | = $\$0.772 \times 10^6$ |
| Impact | = $\$2.331 \times 10^6 \div 2 \times 10^9$,<br>= $11.66/MWh, $12.83/MWh including GST |

This impact was estimated in November 2011 but recent SRES data indicates that around 55 million STCs could be created in 2011. We estimate this would increase the 2012 RET impact to $11.83/MWh.

This is likely to be near the peak RET impact year due to the PV surge in 2011 followed by the STC multiplier drop and the likely fall in LGC price as $CO_2e$ pricing increases electricity wholesale price in 2012-13 making renewable energy more competitive.

Impact will be slightly lower in 2020 when LRET liability peaks at 41,000,000 GWhs **but** LGC price is lower because $CO_2e$ pricing increases wholesale electricity prices making renewable electricity more competitive.

## 2015

| | | |
|---|---|---|
| SRES | | = estimated acquittal could fall to 15,000,000 STCs as STC multiplier falls to 1. |
| Cost impact | | = $(15 x 40 x $10^9$) <br> = \$0.600 x $10^9$ |
| LRET | Liability | = 18,000 GWhs |
| | Average LGC price | = \$55 |
| Total cost impact | | = $(18 x $10^6$ x 55) <br> = \$0.990 x $10^9$ |
| **Total impact** | | = \$1.590 x $10^9$ spread over 210,000 GWhs <br> = \$1.590 x $10^9$ ÷ 0.210 x $10^9$ <br> = \$7.57/MWh, \$8.33/MWh including GST |

## 2020

| | | |
|---|---|---|
| SRES | | = assumed similar to 2015. |
| Cost impact | | = \$0.600 x $10^9$ |
| LRET | Liability | = 41,000 GWhs |
| | Average LGC price | = \$45 |
| Total cost impact | | = \$1.845 x $10^9$ |
| **Total impact** | | = \$2.445 x $10^9$ ÷ 2 x $10^9$, spread over 220,000 GWhs <br> = \$11.1/MWh, \$12.22/MWh including GST |

## 2030

RET terminates at end of 2030.

| | | |
|---|---|---|
| SRES | | = assume similar situation to 2020. |
| Cost impact | | = \$0.600 x $10^9$ |
| LRET | Liability | = 41,000 GWhs |
| | Average LGC price | = \$15 (zero in 2031) |
| Total cost impact | | = $(41,000 x $10^3$ x 15) <br> = \$0.615 |
| **Total impact** | | = \$1.215 x $10^9$, spread over estimated 235,000 GWhs of liable sales |

Price impact = $\$1.215 \times 10^9 \div 0.235 \times 10^9$
= \$5.17/MWh, \$5.69/MWh including GST

## Summary

The data in **Table 1** summarises the RET impact on Victorian residential electricity prices over 2010-30. The impact varies with estimates of SRES take-up, LRET targets and the interaction between wholesale prices (rise as $CO_2e$ prices rise) and STC/LGC prices. The difference between certificate prices and wholesale electricity prices reduces as wholesale prices rise relative to renewable electricity costs.

The result, however, depends significantly on the carbon price profile over the period. Thus, the Federal Opposition has vowed to scrap carbon pricing if it were in government.

| **Table 1** | | **Estimated RET retail electricity price impacts (\$s/MWh, 2010-2030, \$2011, including GST)** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **2010** | **2011** | **2012** | **2013** | **2014** | **2015** | **2016** | **2017** | **2020** | **2025** | **2030** |
| 3.19 | 8.14 | 11.83 | 8.18 | 6.97 | 7.33 | 8.15 | 8.90 | 10.22 | 7.73 | 3.69 |

*Notes:* Estimates are sensitive to gross and net equipment prices, $CO_2e$ pricing, RET liable sales levels, non-RET incentives and RET impacts on wholesale electricity prices.
The estimates are based on assumptions presented in the text above but noting that in 2012 the price impact could be over \$14/MWh when the 2011 STC creation levels are finalised (March 2012).

# 8. Estimates of PV MWs installed by 2012

## 2010 (x 5 multiplier)[3]

$25 \times 10^6$ PV RECs

At a multiplier of 5 in 2010 without the multiplier the deemed RECs would be:

$25 \div 5 \times 10^6$
$= 5 \times 10^6$ deemed RECs

At 20 deemed RECs, on average, per installation, installations would be:

$5 \div 20 \times 10^6$
= 250,000 installations

At an average of 1.3 kW/installation MWs installed in 2010 would be:

$250 \times 10^3 \times 1.3$
= 325 MW (375 MW at 1.5 kW/system; ORER estimate 383 MW)

**Total** at end of 2010 would, on this basis, be 100 MW (installed before 2010) plus about 250 MW installed in 2010 = 450 MW.

Installed system size is increasing.

## 1H11 (x 5 multiplier)

29,140,678 PV (STCs)
≈ 5,830,000 unitary STCs (x5 multiplier)
≈ 194,270 installations at 30 RECs/installation
≈ **290 MW** at 1.5 kW/installation (could be higher, as in South Australia = 2.2 kW)

## 2H11 (x 3 multiplier)

Many 1H11 installations will not create RECs till 2H11, that is, many x 5 installations will not occur until 2H11.

Some FITs have been terminated or reduced, for example in Victoria, South Australia and New South Wales, and thus reduce PV installation incentives.

Overall, however, in December 2011 it seemed likely that there would be high STC creation and PV installation through 2H11 with perhaps 16,000,000 STCs created.

[3] The multiplier increases the deemed annualised RECs (x 1) to encourage PV installation after the PV direct subsidy was terminated in 2009.

At average multiplier of 4 (x 5 hang over plus some in 2H11 at x 3 multiplier)
= 4,000,000 unitary RECs (x 4 multiplier)
= 133,300 installations at 30 RECs/installation (average for 1.5 kW system)
≈ **200 MW** at 1.5 kW/installation

**By 2012** MWs installed:

100 before 2010, 350 in 2010, 490 in 2011 = 945 MW, that is, approximately 1,000 MW of PVs installed by 2012.

More accurate estimates will be possible by mid-2012. (Early 2012 indications are that another 100 MW might have been installed in 2H11, taking capacity total to 590 MW in 2011.)

In **2012** Multiplier drops to 2 on 1 July and 1 on 1 July **2013**.

In **2012 and 2013** installations will depend on: PV gross costs and any PV policy changes.

# 9. Australian PV prices

Bloomberg New Energy Finance research in an August 2011 report found that PV systems in Australia cost 37 per cent more than in Germany and the USA in the first half of 2011. The overseas price fell 29 per cent from 2010 to 2011, while Australian prices were stable.

Bloomberg projects that 5,000 MW of roof-top PV will be installed in Australia by 2020 (about 1,000 MW by 2012), compared with the Clean Energy Council's claim that new FIT scales, low REC prices and the diminishing REC multiplier will stall PV installation growth.

We do not agree with the Council's analysis as falling PV prices and $CO_2e$ pricing electricity price impacts could offset the FIT and REC program changes over 2012-20.

# 10. Victorian wind farm restrictions

Under new regulations introduced in late August 2011, new wind farms in Victoria will be prohibited in some coastal regions, on land where installations would be within 2 kilometres of any existing dwelling without owner consent, and any site within 5 kilometres of major regional centres including Benalla, Wangaratta, Ballarat, Bendigo and Portland. The Clean Energy Council claims $3 billion in investment would be lost due to the regulations as half of potential wind farms would be affected.

Potentially more damaging to wind farm development in Victoria than the rules outlined above is that expiring installation permits already held must have work initiated by March 2012, or else they would have to reapply under the new rules. This stipulation would affect about 700 MW of wind proposals in Victoria held by companies such as Acciona Australia, Union Fenosa, Wind Australia and Mitsui and Co.

Information from Victorian DSE and DPI in July 2011 indicates the **total** number of existing permits for proposed wind farms in Victoria covers 28 approved wind farms with a total capacity of 3,192 MW. Expiry dates on all these permits are not available to NIEIR at this time.

At the current REC price ($45/MWh) due to the large surplus of RECs available for acquitting liabilities under LRET (see above), new wind projects are unlikely to be financially attractive until 2013-2015. That is, the NPV of RECs and electricity prices over the project life are likely to be below the LRMC of the wind projects.

Definition of project initiation and financial analysis of a pre-2013 start-up by March 2012 is required to enable those firms with expiring permits to make investment decisions.

In 2005 Vestas established a blade manufacturing plant in Portland, Victoria and a turbine assembly plant in Wynyard, Tasmania. The plants were closed in 2007 (loss of 130 jobs) and a new plant was opened in Colorado, USA, before the Rudd Government expanded RET (to date met mainly by PV RECs).

# 11. Renewable energy targets for proportion of generation from renewables

| | |
|---|---|
| **Australia** | about 8 per cent in 2011, 20 per cent of consumption by 2020 (45,000-50,000 GWhs). |
| **United Kingdom** | 7 per cent in 2009, 15.4 per cent by 2015-16 (REN 21). |
| **Germany** | aiming for 50 per cent by 2030, 80 per cent by 2050. |
| **China** | 0.8 per cent in 2009, 3 per cent by 2020. |
| **Portugal** | 4.4 per cent in 2010, 55-60 per cent by 2020. |
| **Italy** | 21 per cent in 2010, 26.4 per cent by 2020. |
| **New Zealand** | 7.3 per cent in 2010, 90 per cent by 2025. |

# 12. USA, China and European solar PV industries

The failure of Solyndra, Evergreen Solar and Spectra Waffe Solar PV companies and the closure of BP's PV plant in Maryland, comprising in total about 20 per cent of PV manufacturing capacity in the USA, are severe blows to the USA solar industry.

Although USA, Japanese and European PV industries have a technological, but not a cost, advantage over Chinese rivals which now have almost 60 per cent of world production capacity and rapidly reducing costs. Loans at very low interest rates, low cost or free land for facilities have transformed China from a minor PV player to the dominant player.

Chinese majors – Suntech Power, Yingli Green Energy and Trina Solar – announced 2Q11 sales increases from 33 to 63 per cent from a year earlier. PV panel prices have decreased 42 per cent/kWh over the past year as capacity has increased substantially.

Green energy is a priority in energy planning as concerns over oil dependence, air quality and GHG emissions have escalated. In 2010 PV production in China reached nearly 12,000 MW compared with 1,000 MW in the USA.

In 2010, the US administration challenged the Chinese Government's practice of giving subsidy grants equal to between $6.7 million and $22.5 million to Chinese wind turbine manufacturers that agreed not to buy imported components. China agreed in June 2011 to discontinue the practice, but has already built the world's largest wind turbine manufacturing industry in the past five years and now has highly competitive producers for almost every component.

The Office of the US Trade Representative has continued to investigate whether other Chinese policies may violate WTO rules. If a government does not cancel a policy immediately when it is challenged at the WTO, it takes nearly two years for a case to work its way through the WTO dispute resolution process.

With the cost of solar power down more than 75 per cent in the past four years through technological breakthroughs, large-scale production and competition, the Chinese Government is beginning to experiment with more installations. In early August, it introduced a national feed-in-tariff for solar power installations to sell electricity to the national grid for 1 renminbi (A15.6 cents) up to 1.15 renminbi (A17.9 cents) per kilowatt hour. As recently as 2007, Chinese companies were still implementing small solar projects to produce electricity at four times that price.

By comparison, the grid now pays around 0.4 renminbi (A6.2 cents) per kilowatt hour for electricity generated from coal, the dominant fuel in China, and a little less than 0.6 renminbi (A9.3 cents) per kilowatt hour for electricity generated from wind turbines.